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ABSTRACT

This interim report describes the first few months' work of a task force that developed a set of procedures for conducting a literacy task analysis. A literacy task analysis could be used by employers, union delegates, human resource personnel, trainers, and adult educators to understand better the specific workplace training needs of employees, as well as to provide a method for developing the actual training or retraining curriculum. The interim report contains three chapters, each with a different purpose and focus. Chapter 1 examines the role of education and training as a solution to adult reskilling and upgrading, defines workplace literacy, and describes a number of successful programs in Canada, the United States, and the United Kingdom. Chapter 2 highlights the definitions, purposes, and methods of job and task analysis as a foundation for understanding the dimensions of a literacy task analysis. Chapter 3 describes, in case study format, three examples of how to conduct a literacy task analysis and points out directions for developing some of the training material related to improving such a job. Occupations profiled in the case studies include motor vehicle repairer, grocery store receiver, and pre-cast repair and cleaning laborer. Future research will continue on literacy task analysis and will include production of a manual. The report includes 29 references. (KC)

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Basic Skills Training - A Launchpad for Success in the Workplace

Literacy Task Analysis Project,
Interim Report

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A Reader's Guide

In October 1989 The National Literacy Secretariat funded the Literacy Task Analysis Project in response to a need for business and labour to identify the basic skill requirements of different jobs in various sectors. The purpose of the project was to develop a set of procedures for conducting a literacy task analysis. These procedures would serve to help employers, union delegates, human resource personnel, trainers and adult educators better understand the specific workplace training needs of employees. As well the literacy task analysis would provide a method for developing the actual training or re-training curriculum.

In this Interim Report an attempt has been made to describe the nature of our work over the last few months. We have tried to address the needs of two types of readers - the person with a keen interest in knowing more about workplace literacy and literacy task analysis and the person with an accomplished history in delivering skills training. As a step towards the development of the Literacy Task Analysis Training Manual the Interim Report was divided into three sections or chapters each with a different purpose and focus. Chapter 1 BRIDGING THE GAP - DEMANDS, SKILLS AND SOLUTIONS examines the role of education and training as a solution to adult reskilling and upgrading, defines workplace literacy and describes a number of successful

programs in Canada, the United States and the United Kingdom. For readers interested in a current overview of this evolving field of workplace literacy and its relation to training this chapter may be useful. Chapter 2 JOB AND TASK ANALYSIS highlights the definitions, purposes and methods of job and task analysis as a foundation for understanding the dimensions of a literacy task analysis. Readers searching for a summary of the job and task analysis domain and current practices in performing a literacy task analysis may find this chapter beneficial. Both chapters are abridged from the more complete work of the final Technical Report. Chapter 3 A PRELIMINARY ANALYSIS describes, in case study format, three examples of how to conduct a literacy task analysis and points out directions for developing some of the training material related to improving such a job.

We hope that this interim report will whet the appetite of readers to learn more about the benefits that this form of analysis can bring to be workplace. More particularly, we hope that readers will obtain from this report ideas on how the literacy aspects of jobs - in the broadest sense of the term - can be identified and used to build more effective and targetted training programs for workers.

In our research to date we have found that the topic of literacy task analysis is both mammoth and complex. The interim report is truly just the tip of the iceberg. We hope that this

beginning - along with the technical report and manual to come - will stimulate interest in literacy task analysis as a practical way to upgrade workers' basic skills and to create a more fulfilled and effective workforce.

We welcome your comments and suggestions as we continue with this project.

Maurice C. Taylor

Glenda R. Lewe

Introduction

THE NEED FOR A SKILLED ADULT WORKFORCE

People drive economic growth, and future growth will depend on the skill and adaptability of the people who make up Canada's workforce. Changing world trade patterns and increased competitiveness arising from falling trade barriers are two major factors which influence Canada's economic place in the world.

A volatile mix of forces is at work, creating a unique challenge for employers, workers and governments. Demographic transitions, employment shifts, workplace technology and rising skill requirements form part of that mix. How do each of these forces affect the demand for skilled workers in Canada?

Demographic Transitions

Several demographic shifts have taken place which will affect the ability of the Canadian labour force to adapt to change over the next decade. One of these shifts involves the young and the old. With a slower population growth, young people aged 15 to 24 entering the labour market will make up a smaller portion of the available labour supply. Conversely, older Canadians will make up an increasing proportion of the labour force. In 1986, 49% of the labour force was over the age of 34. By the year 2000 this figure will increase to almost 60%. The retraining of older workers will thus become an urgent priority.

The participation of women in the labour force constitutes another major demographic shift. Women's labour force participation increased from 35% to 57% over the period 1966 to 1988. The growth in female labour force participation will decrease over the next decade. This means that, increasingly, new entrants to the labour force will come from groups who have been traditionally disadvantaged in the labour market such as visible minorities and native Canadians. They will require greater opportunities for training as they take their place in the labour force.

Employment Shifts

Today Canada's economy is increasingly dominated by the service sector which accounts for the largest number of jobs. Within this sector, growth has been largely confined to two industries - wholesale and retail trade, and community, business and personal services. This latter industry accounted for 70% of net job growth in the eighties.

In the report, Good Jobs Bad Jobs, the Economic Council of Canada (1990) points to the fact that virtually all of the recent employment growth has involved either highly skilled, well compensated and secure jobs or unstable and relatively poorly paid jobs. The polarization between the two groups is particularly marked in comparing the managerial, administrative professional and technical service categories with the

traditional service sector, made up of services such as retail trade, hotels, laundry, cleaners, security and repair shops. The traditional services are characterized by lower skill levels, and even when jobs in this subsector are information based, they are predominantly involved with routine data functions. The report refers to a growing segmentation in the labour market and the implication that the labour market is offering economic security to fewer Canadians.

The growth of the service sector does not mean that manufacturing is becoming less important. Rather, it reflects the increased importance of services in the production process. Many Canadian manufacturers are shifting production to the more specialized and information based products that allow them to compete with newly industrialized countries. Thus a wide range of jobs has opened up in high skill services such as financial services and marketing. These jobs, and jobs in construction and retail sales as well, depend upon a healthy manufacturing sector.

Underlying this employment shift is the fact that knowledge has become an essential national resource - a resource which must be renewed constantly to avoid obsolescence. The implications of this move to a knowledge based economy are obvious. It means that learning must not stop after formal education is complete; rather it is a process that must continue throughout the course of a life time.

Workplace Technology and Rising Skills Requirements

According to the Report of the Canadian Labour Market and Productivity Centre Task Forces on the Labour Force Development Strategy (1990), technological advances are significantly altering economic activity. The report points out that the effective application of new forms of technology will be the single most important source of job creation, wealth and value - added in the years ahead. Thus we see the emergence of the "training imperative" to ensure that the skills of both new workers and those already in the labour force are adequate to this new challenge.

In addition, this technological change has already had an impact on the workplace, placing pressure upon affected workers to equip themselves with new skills. Emerging technologies, therefore, have serious training implications for a significant segment of the labour force. In many cases workers will be required to upgrade existing skills, but often they will need to develop a different and broader set of skills. This will be particularly difficult for workers with limited education and basic skills deficiencies - all the more so, since, according to Employment and Immigration Canada, (1989) of all the jobs created between 1986 and the year 2000, 64% will require more than 12 years of education and training, and almost half of these jobs will require more than 17 years of education and training.

When viewed together, demographic transitions, employment shifts and workplace technology and rising skill requirements, form a dramatic backdrop for change. Clearly, new and different training strategies will need to be developed and implemented if Canada's workforce is to obtain the type of training required to enter the new milennium. Basic skills training will be the launchpad for many workers as they seek access to new skills.

Chapter 1

BRIDGING THE GAP: DEMANDS, SKILLS AND SOLUTIONS

The growing gap between workplace demands and workforce skills is becoming increasingly visible. This chapter examines a number of key areas which relate to this gap. These areas of discussion include the views of business, labour, education, and government toward the role of education and training as a solution to adult reskilling and upgrading; workplace literacy - what it is and how it differs from general literacy; and the kinds of workplace literacy programs that exist in Canada, the United States and the United Kingdom and what makes them successful.

The Importance of Education and Training

New approaches to education and basic training have become necessary to respond to demographic and economic factors which continue to effect changes in the workplace. Business, labour, education and government are rethinking ways of preserving and enhancing Canada's economic vitality and worker's sense of full participation in the workplace. Types of trainees, skills and competencies, appropriate learning environments, accessibility to workplace training and financing are all areas which form part of this rethinking process.

For example, in a recent survey by the Canadian Labour Market and Productivity Centre, (1990), one third of the business leaders and one half of the labour leaders who responded saw illiteracy as a problem in the Canadian workforce.

The Canadian Chamber of Commerce, in its Report of the Task Force on Education and Training (1989), has also looked at worker skill levels. The report makes a case for good basic education and training as an essential complement to job-specific skills. It maintains that small and medium sized firms, as well as large firms and organizations, must undertake a more sustained training effort, geared to emphasis on general skill development.

Employment and Immigration Canada as well has voiced the need for augmented workforce training. Their report Success in the Works (1989) points out that workers already in the labour force will represent the largest portion of workers in the year 2000. With almost 60% of these workers having secondary education or less, a large percentage of the workforce lacks the education and training for the majority of new jobs in the 1990's - unless efforts are made to supplement their vocational skills.

Basic skills deficits have also surfaced as a significant barrier to re-employment. In 1989, Employment and Immigration Canada estimated that during the previous year, approximately 1.1 million job seekers had difficulty in finding work due to skill deficiencies, while 800,000 identified a lack of education as restricting their employability.

In addition to federal interest in building worker skills, provincial governments have also developed strategies to improve skills training. Ontario, for instance, has called for a new training system and has put its foundation into place. Since 1984 - 1985, the province has almost doubled its allocation to training and to work experience programs. The report Building a Training System for the 1990's; A Shared Responsibility, (1989), points to the need for all workers in the future to have at least a basic level of skills, including literacy and numeracy.

As education and training take on a new focus among the major stakeholders, delivery mechanisms become more important. Employers are now reporting difficulty both in hiring skilled workers and in finding entry level applicants who can read, write and compute well enough to participate in company training programs. A new approach to skills training is clearly required. This approach is workplace literacy.

A Literacy Definition for the Workplace

Efforts to define literacy in the workplace in a concrete and realistic way have led to two schools of thought. On the one side of the debate are the "literalists" and on the other side the "contextualists". (Chynoweth, 1989, p. 13).

The "literalists" argue that if one can read and write short, simple statements relating to everyday life, one is

literate. Literacy programs that register students' progress by reading levels reinforce this definition. With the "literalist" approach, individuals can be grouped, tracked and counted, with literacy being related to grade level completion. Employers have found, however, that successfully completing the 10th grade does not guarantee a 10th grade reading level - nor does a grade 10 certificate guarantee the skills needed to function in the rapidly evolving workplace.

The "contextualists", on the other hand, argue that individuals are literate only if their reading, writing, computation, reasoning and communication skills match the requirements of their environments. Literacy programs that measure individual progress in terms of functional competency support this view. Tests and training materials built on contextual definitions must be "custom" designed. Since they cannot be standardized, they tend to be expensive to develop and are more difficult to communicate to the public. However, basic skills programs based on context may be more relevant for employers and employees. Employees will be attracted to and remain in programs only when they see immediate and practical value in instruction. Both employees and employers are interested in improving job performance. Focusing basic skills instruction on specific job requirements will help to decrease the gap between workers' skill levels and the competencies required to do their jobs.

Literacy for the workplace has many facets and means many things.

- It means interpreting computer printouts from an engine diagnostic machine.
- It means calculating gross profits on the shop floor.
- It means following directions for the use of workplace hazardous materials
- It means using time and space management skills when unloading deliveries.
- It means measuring pipes to specification.
- It means understanding a circuit wire diagram when repairing a VCR.
- It means giving clear and succinct directions to a night crew.
- It means explaining delays to customers.
- It means ordering parts and checking inventory by computer terminal.

The basic skills of reading, writing and arithmetic - the skills that were once perceived as the most important core skills for employees - are now seen as forming only the tip of the iceberg. These skills are, increasingly, being seen as complex rather than simple.

According to Askov, (1989), workplace literacy may be defined to include the written and spoken language, basic communication and computation, and the thinking and problem solving skills that workers and trainees use to perform job tasks or training. This extended operational definition provides a more concrete framework for better understanding of the

competencies necessary to work effectively and efficiently in the labour market of the 1990's.

Differences Between Workplace Literacy and General Literacy

Clearly, reading for the job varies considerably from reading for a school setting. At school, a student reads primarily to obtain literal facts. More often than not, the individual begins at page one and continues sequentially through a text. Exposition and narrative are the main types of reading encountered.

In the workplace, however, most job-related reading is done to accomplish specific tasks. Rather than reading from a single text, workers must gather information from several sources to solve problems and provide services. Manuals, directions and diagrams form the core of workplace reading.

There is also a significant difference between workplace and school based writing. At school, writing is used to take notes, answer exam questions and copy information. More emphasis is placed on producing a standardized written product and less on solving problems, communicating ideas or accomplishing tasks. In the workplace, on the other hand, writing is for a specific purpose. It tends to be briefer and more focused, and often must be understood and used by a co-worker participating in a team effort.

In regard to computation and mathematics there are also vital differences. Computation done at school tends to be textbook generated and often unrelated to real life situations, whereas computation at work has an immediate application. Knowing the Pythagorean Theorem, for instance, may be a matter of academic interest only in the classroom. But for the construction worker on the job it can have an immediate rewarding application - such as finding the correct pitch to a roof. As well, school computation often proceeds in learning units of increasing difficulty, with practice and testing based on the units, whereas workplace math is more eclectic and diverse, with instant decisions being made based on calculations.

Unfortunately, many high school students and vocational school trainees are unprepared for how basic skills are used in the workplace. According to Rush, Moe and Storlie (1986), trainees in vocational training programs used "reading to learn" and "reading to do" strategies, with little attention being given to "reading to assess". Yet, knowing "whether" and "when" to do a task is just as important as knowing "how" to do it.

Taylor (1989) reports findings that also corroborate the differences between general and workplace literacy. Taylor's study investigated the literacy requirements of the more basic vocational training programs and corresponding occupations. Writing skills were used by trainees for note taking, assignments and examinations. The style of writing was more formal than that

of the workplace. Trainees read mostly textbooks, reference books and course handouts, while on-the-job workers tended to read technical references, work practices, policies and instructions, handbooks, memoranda, correspondence and training manuals.

When Mikulecky and Winchester (1983) investigated job literacy and job performance among trainees and workers in a health occupation, they found significant differences between the kinds of literacy abilities called for in most training classrooms and the kinds of literacy abilities used on the job. Reading and writing on the job were consistently used as tools to complete tasks rather than to fulfill more general purposes. As well, master performers differed from their "adequate" counterparts in their ability to think through what needed to be accomplished and then apply their reading and writing abilities to efficiently complete job tasks. Master performers knew when to skim, when to look for new information, when to check a reference and how to find ways to organize notes and information to better do their job. Trainees, on the other hand, appeared to be less competent at higher level abilities such as summarizing and dealing with unfamiliar material.

Using a similar approach for the occupation of electronic technician, Mikulecky and Ehlinger (1986) studied the influence of metacognitive aspects of literacy on job performance. Three employment levels (training, experienced and supervisory) were

examined. In summary, trainees spent more time than experienced and supervisory employees performing job-related reading which was problem related. They also read most often to learn in the process of performing tasks. Master performers - whether they were supervisors, experienced technicians or trainees - were better able to identify key concepts and ideas. They were independent and able to operate on their own. In addition, they tended to develop their own sophisticated information retrieval system.

Several conclusions can be drawn from these studies.

1. Workers read a variety of materials on the job, whereas students read fewer types of material.
2. Workers read to problem-solve, whereas students read to gather facts and memorize for tests.
3. Workers at the trainee level are called upon to read more than are the more experienced workers.
4. Workplace literacy calls for higher order metacognitive skills than are found in school and vocational training settings.

These conclusions underline the need for businesses, unions, educators and governments to better understand the nature of workplace literacy so that appropriate training and retraining strategies may be developed.

Workplace Literacy Requirements

Hull and Sechler (1987) examined the nature and extent of adult literacy needs in several major U.S. corporations. The

study results indicated that basic literacy skills often serve as a pre-requisite to the learning of more technical knowledge. Company managers, instructors and union trainers reported that the types of skills needed to enter and progress on the job could be classified into five major categories: mathematics, reading, writing, listening and speaking.

Basic workplace research conducted by the American Society for Training and Development and the U.S. Department of Labour also examined the skills needed in the workplace. Carnevale, Gainer and Meltzer (1988) indicated that recent employer complaints have focused on deficiencies in areas that include problem solving, personal management and interpersonal skills. They also cited the abilities to conceptualize, organize and verbalize thoughts, resolve conflicts and work in teams as critical areas.

In a pioneering attempt to conceptualize the skills employers want, the authors proposed a framework of seven skills groups which forms a prescription for a well rounded worker. These groups are: (1) learning to learn; (2) 3Rs (reading, writing and computation); (3) communication - listening and oral; (4) creative thinking and problem solving; (5) self-esteem, goal setting - motivation, personal and career development; (6) interpersonal, negotiation, teamwork, and (7) organizational effectiveness and leadership.

Skills of very like magnitude were identified by Pestillo and Yokich (1988) when they developed a working construct of employability skill categories in order to assess the work readiness needs desired by employers. The five categories which they identified for effective performance were: academic; personal management; career mobility; group and organizational effectiveness, and adaptability. This working construct was initiated by the Employability Skills Task Force co-chaired by Ford Vice President Pestillo and UAW Vice President Yokich.

The Ontario Ministry of Skills Development (OMSD) has also developed a training profile which reflects the skills, competencies and tasks performed in the workplace. The OMSD project carried out by Shields, Embree, Taylor and Wallace (1989) surveyed 329 employers across nine industrial sectors ranging from manufacturing to service hospitality. The goal of the project was to develop an integrated curriculum accommodating the basic training needs for three broad client groups - (a) those bound directly for employment; (b) those wishing to qualify for skills training and apprenticeship, and (c) those wishing to qualify for post-secondary programs. Occupational literacy skills needed to enter and progress on the job were divided into five major categories - reading, writing and other linguistic competencies, mathematics, science, computer literacy and work adjustment.

The American and Canadian research clearly indicate that it

is helpful to break down literacy skills into component parts and address literacy training needs for each of these parts. The Basic Skills Profile devised for the Literacy Task Analysis Project is a compilation of the major skill categories, with examples of specific skills drawn from evidence in Ontario workplaces. The skills given here in Figure 1 are those most frequently cited by employers. The profile may serve as a useful starting point for educators or trainers embarking on a literacy task analysis. Results of actual analyses can be viewed in the light of these categories, and job specific training curriculum for workplace literacy programs can be developed using the various elements of the profile. Figure 1 appears on pages 18 and 19.

FIGURE 1

A Basic Skills Profile

1. Basic Literacy and Numeracy Skills (reading, writing and computation)

    * Read notes, job orders, schedules charts, regulations and instructions.
    * Read to determine facts, opinions or implied meanings
    * Write short notes & single paragraph letters
    * Complete forms using figures, short phrases and sentences
    * Use the basic number operations
    * Recognize geometric figures
    * Estimate how long it will take to do a job & measure metric units

2. Basic Listening and Oral Communication Skills

    * Receive facts or directions
    * Understand opinions, purposes or implied meanings
    * Give information
    * State possible reasons which might cause certain faults or symptoms

3. Creative Thinking and Problem-Solving Skills

    * Ask probing questions
    * Use reference manuals
    * Establish a priority or sequence in checking for problems
    * Solve numerical problems in word form
    * Show information
    * Implement solutions
    * Track and evaluate results

4. Personal Management Skills (skills related to developing the attitudes and behaviours required to keep and progress on the job)

    * Know company policies and practices
    * Know employer/employee expectations
    * Time management
    * Showing initiative and suggesting new ideas for getting a job done
    * Learn new skills and ways of doing things
    * Know the basic work place hazards
    * Care of equipment and materials

5. Teamwork Skills (skills needed to work with others on the job)

    * Work with supervisors and co-workers
    * Stick to a schedule
    * Decision making skills
    * Giving directions
    * Giving feedback
    * Identify with the goals, norms, values, customs and culture of the group
    * Exercise "give & take" to achieve group results

Workplace Literacy Programs

Workplace literacy has developed in a variety of ways, depending on the location, the sector and the motivation behind the training. The Canadian, American and United Kingdom experiences have differed significantly. In order to assess how a workplace literacy program and a task analysis approach would benefit a specific workplace, it may be useful to highlight some of the programs which are presently in operation and outline their major elements.

The Canadian Experience

FRONTIER COLLEGE, with its history of basic skills instruction in mining communities and remote work camps, dating back to 1899, was probably the first voluntary association to provide literacy instruction in a working environment. Its modern day program, Learning in the Workplace, has extended the tradition into an urban context. Frontier now provides employers with workshops and train the trainer sessions on workplace literacy, covering a wide range of topics such as diagnosing literacy needs in the workplace, carrying out organizational needs assessments, recruiting students and teachers and developing learning materials. In addition, Frontier offers employers consulting services, plain language training and editing and the production of learning materials. A wide variety of companies, with mandates ranging from automotive to steel and

from meat packing to forest products, have participated in Frontier's program which is funded through government.

THE BASIC EDUCATION FOR SKILLS TRAINING (BEST) PROGRAM OF THE ONTARIO FEDERATION OF LABOUR provides an example of a labour based literacy program conducted in the workplace. In 1988, with funding from the Ontario Government's Ministry of Skills Development, the Ontario Federation of Labour set up a "peer-tutoring" literacy model in workplaces across Ontario. Trainees are employed or unemployed union members, and instructors are rank and file trade union educators who have been trained by BEST staff. Classes are held in the workplace or in nearby union or community halls. Many are offered partly on employer's time. With a learner centred approach, instruction is based on subjects which the learners wish to address, ranging from health and safety in the workplace to getting help in filling in forms or understanding children's report cards. BEST, essentially a community based program delivered in the workplace, has several major strengths. The strength of the O.F.L. has led to the program accessing a large number of workplaces in a relatively short time. It has also led to a heightened awareness of literacy issues by employers. Indeed, literacy has become an issue around which both management and labour can coalesce. With a headquarters in Toronto and regional offices in Brampton, Guelph, London, Orillia, Ottawa, Timmins, Thunder Bay and Welland, BEST is well positioned to offer its services throughout the whole province.

THE ROYAL COLUMBIAN HOSPITAL in Vancouver is the site of a another partnership model of workplace literacy, funded jointly by the federal government and the Government of British Columbia. The partners are the hospital's management, the Hospital Employees' Union and Douglas College of New Westminister. The program was set up to assist cleaning staff, orderlies and dietetic aides, some of whom had difficulties in such job tasks as reading menu plans and food choices or reading directions for solvents. Using a room distant from the wards where employees worked, workers had an on-site program, but one which allowed a high degree of independence from their normal work situations. Classes were scheduled to overlap two common shifts, with participants coming either before or after their working hours. The program was presented as a basic skills upgrading program, and extensive pre-planning went into its marketing. Both union and management support of the project was secured at the outset through contact with the B.C. Federation of Labour and the Hospital Employees' Union as well as the hospital's management staff, including the Director of Employment and Compensation, the Director of Personnel and the Labour Relations Analyst. The instructor for the project was hired by Douglas College. Initial work with course design, recruitment and assessment paved the way for the actual implementation of the program.

Boards of Education have also shown an interest in workplace literacy initiatives. The SCARBOROUGH BOARD OF EDUCATION

provides an example of Workplace Classes offered to business, industry, government and labour organizations. In co-operation with employers and employee groups, Workplace Classes (WPC) staff design and deliver classes at the workplace, before and after shift, for workers and supervisory staff. WPC aims to assist organizations to adapt to a changing workforce and to upgrade employees to meet the technical needs of today. In tailoring courses for clients, the instructors of WPC visit the shop floor, probing machines and manuals, and photographing equipment and processes, so that the course design will reflect the reality of a specific workplace rather than generalities. Through Workplace Classes, the Scarborough Board has also built linkages with the Scarborough Business Industry Education Council, showing the kind of further outreach that workplace literacy classes can engender.

The JOB EFFECTIVENESS TRAINING (JET) program run by the Alberta Vocational Centre exemplifies a multi-faceted approach, concentrating on detailed preparation in order to obtain the appropriate curriculum and instructors. Beginning with needs assessments, made up of interviewing, observation and photographing work processes, JET established a three level, one hundred hour course for employees at the Stelco Steel Edmonton Works. The competency based curriculum sets out the exact tasks that each student must master in order to reach the required competencies which had been determined in a DACUM (Developing a Curriculum) workshop. Terminal performance objectives relate to

seven main areas of worker need - Adjusting to the Job and Co-workers; Learning and Thinking; Listening and Speaking; Reading; Writing; Mathematics; and the Workplace Hazardous Materials Information System (WHMIS). Workers attending the JET program attend classes once a week for five hours on their day off after completing a four day shift. Half the time is sponsored by Stelco Steel, whose management has taken a great interest in the program, and indeed has participated in the program through arranging class visits to major contractors. Classes are held at the Alberta Vocational Centre in order to allow for a one hour session each week in the computer lab. The course instructors were trained through two 30 hour Train the Trainer workshops which brought about a pool of 40 qualified instructors. The 12 Stelco employees who just graduated from the first JET program in April, 1990 are enthusiastic and asking for further upgrading.

As in the JET, BEST and Frontier programs, Train the Trainers has been a major component of getting a workplace literacy program up and running. The Literacy Institute has proven to be an effective way to provide workplace literacy training to literacy practitioners who wish to extend their experience from a school, college or community venue to the completely different atmosphere of the workplace. THE GEORGE BROWN COLLEGE LITERACY INSTITUTES funded by the Ontario and federal governments in April and May 1989 aimed at increasing participants' awareness of communication issues in the workplace.

Topics covered in each of the two week sessions held at the Adelaide St. Campus of George Brown College in Toronto included organizational needs assessments, the design and implementation of workplace literacy programs, and marketing and evaluation strategies. Each of the 60 participants was asked to prepare a post-Institute practicum. One such practicum from a London, Ontario participant outlined a project completed at an automotive parts manufacturing company. The report included information about the needs assessment, the use of questionnaires to supervisors, analysis of information and the preparation of both general and job specific material. The participant credited the Institute with expanding her horizons regarding the step-by-step process in designing a training curriculum. The Literacy Institute concept is now expanding to other provinces and can be viewed as a practical and useful way to build bridges among labour, management, educators and government.

The Nova Scotia Department of Advanced Education and Job Training has initiated a workplace upgrading applied research project that currently includes several workplace programs. One program, at a NOVA SCOTIA DAIRY COMPANY, introduced a 16 hour course to 10 of the 32 employees. The program was given at a local high school on Tuesday nights, with each session lasting two hours. The Work Place Hazardous Materials Information System (WHMIS) Guide was used to improve the reading of technical material, while arithmetic skills were developed through the

study of metric measurements. Material on dairy plant sanitation was used to help workers to write short reports. In the program, emphasis was placed on job related knowledge and skills rather than generic academic skills. Another program was set up for workers at a NOVA SCOTIA PEWTER AND SILVER SOFTWARE COMPANY. A 16 week program of 64 hours was established for 22 participants. The course takes place at the employer's Resource Centre on Mondays and Wednesdays from 3:30 to 5:30. The course contains 4 modules, designed to develop written communication skills, to achieve clarity and variety in written expression, to improve reading comprehension, and to prepare for a GED. Most of the participating employees have been out of school for 10 years or more. The Nova Scotia Department of Advanced Education and Job Training assumes the instructor's cost. The employer provides training facilities in the workplace and pays one hour of each session, (32 hours) with the employees offering their time for the remaining 32 hours.

The literacy initiatives outlined above are indicative of the various basic skills programs which can be found in Canadian workplaces in every province and territory in Canada. It should be pointed out, however, that such initiatives represent a small part of the Canadian training picture. Yet, through this type of partnership building, literacy training can become an integral part of other workplace training, providing a more solid base both for economic growth and for individual achievement.

The United States Experience

The United States has been engaged in workplace literacy initiatives over the past several decades, and has devoted major funding to them through the Job Training Partnership Act and other legislation both at the state and national level. Efforts by the National Alliance for Business, the Business Council for Effective Literacy and the American Bankers' Association attest to the business interest in the subject of literacy, and major American unions such as the United Auto Workers, Teamsters, and United Steelworkers have mounted effective workplace programs as well. In addition, a number of union led consortia have been developed to address basic skills needs in the workplace. The following examples provide an indication of the many innovative approaches to workplace literacy which have been initiated in the United States.

POLAROID CORPORATION. The Polaroid approach to basic skills upgrading was developed in response to the need to assist employees working in the Corporation's labour intensive, assembly line operations. In 1970 an in-house program was developed featuring ABE, GED and ESL components. Two programs were developed for hourly employees, focusing on pre-technical skills and basic remediation in basic skills. Fundamental Skills tutorials, classes and labs are offered in basic math, ESL, reading and writing, according to need throughout the company.

Job-related basic skills criteria have been established for all hourly positions, and literacy, ESL and basic math assessments have been developed and correlated to job tasks and training programs. The Technological Readiness program provides hourly employees with additional skills in science, math and computers. The two hour sessions take place at the beginning or end of shift, and program time is shared between employer and employee.

THE MASSACHUSETTS WORKPLACE EDUCATION PROGRAM. This program, developed at the request of Governor Michael Dukakis, is one of the first long-range planning models that links literacy to clearly defined job market needs. The program is jointly supported by the Department of Employment and Training, the Department of Education and the Executive Office of Labour. Immigrants, refugees, low income and potentially dislocated workers were among the target groups for this three year demonstration project which consists of twenty programs in approximately forty worksites. The following initiatives are part of the Massachusetts Workplace Education Program. Laundry and Drycleaning Union, Local 66 set up a program to instruct their largely immigrant/refugee membership on how to handle hazardous workplace materials, and how to qualify for higher paying jobs through greater language skill acquisition. The Franklin/Hampshire Employment and Training Consortium provides machine shop and paper mill employees with high school equivalency. Friction Materials Ltd., in partnership with the

Lawrence Public Schools Adult Learning Centre, provides workers with adult basic and ESL instruction, with five hours of paid release time per week. The Bristol County Training Consortium is a partnership between the Labour Education Centre at Southeastern Massachusetts University and the Needle Trades Action Project. The Consortium developed a program to develop the region's apparel industry through a literacy skills program focusing on work and union related curriculum materials.

ONAN CORPORATION. Onan Corporation is a world leader in the manufacture of portable and stationary generators, and gasoline and diesel engines. In 1982, spurred by accelerated technological change, Onan introduced a comprehensive on-site program that included basic education and pre-technical courses. The courses in communications (reading, writing and study skills) computers, and mathematics served as prerequisites for increasing technical skills in the mechanical, electrical and quality assurance areas. Part-time instructors for the program were supplied through the school district in the area. Classes were scheduled for fifteen weeks and held in various plant lunch rooms once a week in two hour sessions immediately after or before shift. While no formal credits for the courses are awarded, the success of the program has been assessed by both instructors and trainees.

The International Union of Bricklayers and Allied Craftsmen (BAC) and the International Masonry Institute (IMI) have established a Training and Learning Partnership, BAC TO LEARNING. Working with the Council for Adult and Experiential Learning (CAEL), and funded through the US Department of Education under the Workplace Literacy Partnerships Programs, BAC and IMI have devised a pilot program in three locations - New York, Chicago and Los Angeles. The workplace literacy skills targetted by this training program include: reading, computation, writing/sketching, speaking/responding and problem solving. Three different models are being applied in the three locations. In New York, a competency-based, computer assisted instructional system is being utilized, while the Chicago approach focuses on individual or small group tutoring services. In Los Angeles the program is built around video literacy materials developed by Public Television and instructional materials vendors. IMI/BAC plan to utilize the results of the three pronged approach to devise a single effective literacy delivery system for BAC members. The BAC to Learning program is built on the equation that "Craft Skills + Learning Skills = Better Jobs and More Earning Power".

The United Kingdom Experience

The British Workplace Literacy experience has been shaped by the work of the Adult Literacy and Basic Skills Unit (ALBSU) and by a number of decentralized project approaches which have taken

place in England and Wales with the help of this organization. ALBSU, initially set up for a three year period in 1982, has proven invaluable as the central focus for adult literacy and basic skills in England and Wales, and has seen its mandate extended and expanded over the past five years. ALBSU has taken the view that literacy training should not be conducted only by traditional literacy providers, but rather should also encompass providers with a wide variety of mandates. In the workplace this approach has led to a number of business, labour, government and education partnerships.

THE ALBSU AND MSC PARTNERSHIP. A Partnership between ALBSU and the Manpower Services Commission (MSC) provides an example of how demonstration projects have led to a fuller understanding of literacy needs of the unemployed and the under-employed. Among pilot projects commenced in 1988, were courses in Hull and Telford which provided 20 weeks of training aimed at helping trainers improve their basic communication skills while at the same time focussing on local employment opportunities. Other ALBSU and MSC projects developed literacy elements within Work Preparation Courses geared toward specific work situations. These projects indicated that basic skills instruction offered within a work milieu and providing a route for further training or employment, was much more attractive to adults than basic education courses which did not have an employment aspect.

WORKBASE. Since 1978 Workbase has been promoting and providing basic education courses in work time, on work premises for manual workers. Probably the best known of all British workplace literacy initiatives, Workbase has supplied the model on which some successful American and Canadian programs have been built. Workbase offers a number of services, including Train the Trainers, advice on setting up workplace courses, and assistance on program design. A key aspect of Workbase is its emphasis on trade union involvement as an essential element of success. Indeed, trade unionists started the project, and getting employers to recognize the needs of manual workers has been a major goal in Workbase's development. Workbase has helped many organizations to address the basic skills needs of their employees. Among them are BBC Radio, The London Fire Brigade, The University of London, the London Borough of Westminster and the Leeds City Council.

THE BASIC SKILLS ACCREDITATION INITIATIVE. The Basic Skills Accreditation Initiative is sponsored by the BBC, the Employment Department and Training Agency and ALBSU and is based on a study carried out for these agencies during August 1988. The study recommends an approach to certification in adult literacy and numeracy to respond to a wide variety of different un-coordinated practices currently in effect. The idea is to establish a context-free set of "core area outcomes" which could be applied to various industries. The certificate resulting from the

initiative would have transferability across vocational areas and would build bridges between education and training. Certificates in literacy and numeracy envisaged under this initiative would be based on curriculum guidelines developed for each industry with its active involvement in the process. Industries would include hotel and catering, construction, engineering, road transport, and retail. A wide range of delivery bodies such as colleges, community providers, companies and industry training centres and schools will be encouraged to offer the certificates. The role of broadcasting is recognized as an important motivator and delivery mechanism. The transferability of credit accumulation from one vocational content to another is seen as the major strength of the Basic Skills Accreditation Initiative, since it will permit workers to achieve recognition for skill competencies and to transfer these competencies from one work setting to another with minimum disruption. The Basic Skills Accreditation framework has been completed for two levels of communications skills - reading and writing, and listening and talking. Students have now received certificates. Work on two further communication skills levels is in progress, with trial delivery scheduled for October, November, 1990.

Conclusions

There are several conclusions that may be drawn from an examination of the Canadian, American and United Kingdom workplace literacy experiences.

* Successful programs tend to be relevant to both employer and employee. They serve organizational goals, while at the same time benefitting the worker personally on the job.

* Literacy skills are perceived as the gateway to the acquisition of higher level technical skills.

* Innovative partnerships are producing exemplary programs which can offer new instructional models. In all cases, the key to success is the partnership, with each partner bringing to the project a measure of expertise to complement the expertise of the other partners.

* There is no standard recipe for success. Learner centred, general content programs and job specific, competency based programs each offer their own strengths in the workplace and are not in competition with one another.

* Just as there is no one instructional technique, there is no one method of assessment of trainees or evaluation of program success.

The experience of the three countries support the idea, set forth by the Business Council for Effective Literacy and others, that it is important to teach basic skills using the content of specific jobs, and that teaching literacy strategies appropriate to workplace needs will enable employees to accomplish specific tasks, make judgements and solve problems. This suggests that the training curriculum should be customized to the real jobs that take place in real workplaces. If trainers use materials actually found in the workplace to develop their training courses, workers will see the relevance and will be able to apply their new knowledge in their own job. More important, they will see the gateway to promotability to a higher skill job.

Many workplaces are ready for a literacy initiative. What is lacking, however, is detailed knowledge of how to determine the literacy requirements of various jobs and how to design a literacy program which will lead literate workers to greater personal and job success. Literacy task analysis may provide assistance to companies, unions and educators seeking to use the job itself as the key for unlocking the mysteries of literacy for the workforce.

Chapter 2

JOB AND TASK ANALYSIS

The Historical Context

Job analysis and task analysis are terms which are in common usage in the domains of industrial psychology and human resource management. Seemingly simple terms, job analysis and task analysis are in fact complex, encompassing a great many purposes and designs. As is suggested by the terms, job analysis refers to analyzing the various properties of jobs, whereas task analysis refers to analyzing specific tasks within jobs. While the two terms are sometimes used interchangeably, it is wise to keep this basic distinction in mind. The purpose of this chapter is to highlight the definitions, purposes and methods of job and task analysis as a foundation for understanding the dimensions of a literacy task analysis.

In a recent discussion on its historical antecedents Primoff and Fine (1988) trace back job analysis to Socrates and his "just" state which recognized individual differences in aptitude for work and unique requirements of different occupations. Diderot, the eighteenth century Encyclopedist, is also credited with early applications of job analysis through his comprehensive description of trades outlined in his Encyclopedia.

However, job and task analysis is most often thought of as a late 19th and 20th century phenomenon, with early applications being tied to the scientific management techniques devised by Frederic W. Taylor in 1903. The scientific management approach linked the aims of the engineer and the psychologist, using time and motion studies to determine the optimum way of performing a job. Early job analysis is often linked to the two world wars, with the many technical requirements of jobs and the urgent need for these jobs to be well understood and well planned so that recruits could either be channeled into jobs for which they already had the particular background or skills, or trained for those jobs.

In between the two world wars, a further use for job analysis was initiated, linked to employment development. The U.S. Dictionary of Occupational Titles was an outgrowth of this phase, defining as closely as possible all the jobs in the American economy. In Canada this Dictionary of Occupational Titles was used until the mid-sixties when the Canadian Classification and Dictionary of Occupations was developed.

The Evolving Uses of Job and Task Analysis

The most common uses for job and task analysis relate to the areas of personnel staffing, training and promotion. Job descriptions, the basis of most employees' established duties and compensation packages, are built on job and task analysis, either in general or specific form. Job restructuring in the light of

technological or organizational changes also utilizes this technique.

Some organizations use job and task analysis as a way of setting minimum standards for entrance to a job, while yet others use it to conduct performance appraisals, based on how well employees relate to specific elements of jobs as defined by analysis. In the past several years employment equity has become an issue of great importance in the workplace. Job and task analysis has been called upon to help determine standards of equity when comparing two or more jobs.

The purposes for which job analysis are used will determine its structure and methodology. A literacy task analysis, for instance, aimed at identifying training needs, will have a very different approach than a job analysis which seeks to clarify tasks for the purposes of reclassification of positions.

Definitions of Job and Task Analysis

According to Ash (1988, p. 3), job analysis broadly defined, is the collection and analysis of job-related information by any method for any purpose. This procedure attempts to reduce to words things people do in work. In a similar vein, Pearn and Kandola (1988) define job analysis as any systematic procedure for obtaining detailed and objective information about a job that will be performed or that is currently being performed.

Job analysis can vary on several dimensions, for example, the types of descriptors or elements used to describe jobs, the ways in which job information is obtained - either qualitative or quantitative, the sources of job information, the methods of data collection and the level of analysis. Considering these dimensions, and the fact that a single job analysis methodology can involve multiple aspects of each dimension, two things seem to be apparent: (1) there are many ways to analyze jobs; and (2) job analysis can be a somewhat complicated undertaking.

To better understand the procedures for task analysis it is important to know the characteristics of a task. A task is a goal directed unit of work - for example, replacing a wheel bearing, operating a hand-jigger or completing a driver's trip sheet. Tasks may involve the use of tools and equipment as well as the use of written procedures and other job aids. A task may be mental, physical, or a combination of both, but will have the following characteristics in common:

- a set of conditions that require and initiate human performance
- a definite purpose
- a definite beginning and end
- occurrence in a relatively short period of time
- the possibility of being interrupted by another task, and

- the possible involvement of another person as when one person initiates a task by giving a command (Van Cott and Paramore, 1988, p. 653).

Tasks can also be divided into smaller units called task steps, subtasks or behavioural elements. It is seldom sufficient to conduct a task analysis that simply identifies tasks by name alone. More often tasks are subdivided into component elements to obtain the level of detail needed to perform a meaningful evaluation of such elements of task performance as the required skills and knowledge.

Differences Between Job and Task

A job consists of all the tasks performed by a given person, position or job category, such as mechanic, receiver or bakery clerk. In other words, a job is a group of tasks that has been assigned to a single employee. Determining whether a job or task analysis is most appropriate generally depends on the stage of development or change within an organization. In a company or firm that has been in operation for some time positions will exist and tasks will have been assigned to each position. At this point, either a task or a job analysis may be appropriate depending on the problem being examined. For example, a job analysis rather than a task analysis would be needed if information were required to write job descriptions in order to establish wage and salary guidelines. On the other hand, if a company has introduced the use of robotics technology and is

interested in retraining employees, a task analysis would be needed to determine the new tasks required to implement the change.

Approaches and Techniques in Job and Task Analysis

There are numerous methods for collecting job information. Ash (1988, p.4) describes three data collection methods: observation (direct, critical incident diaries, work sampling); interviews (individual, group, technical conferences with subject matter experts); and questionnaires (structured and activity checklists, open-ended). Each method has its own set of procedures which will be outlined in the Literacy Task Analysis Manual.

Pearn and Kandola (1988) suggest that one of the main challenges for analysts in performing a job and task analysis is to conduct it in such a way that it does not artificially distort the job or task being analyzed. There is a risk that when the job or task is broken down into specific sub-tasks or elements, the dynamic properties of the job or task are missed. By concentrating on the microscopic detail, the analyst could fail to see aspects of the overall picture which are critical to success. In addition, the authors suggest that there are several factors which make it difficult to obtain accurate and meaningful data. First, there is a risk that the analysis may take a snapshot picture which freezes the job or task at some point,

providing little insight into how the job has evolved or will change in the future. Second, the job or task may take on different properties depending on who happens to be doing it. Third, there are situational variances. The job description of an automotive mechanic in a small town garage may be identical to that of an automotive mechanic in a large urban car care company, but the jobs could well differ in practice. These considerations should be borne in mind when conducting a job or task analysis.

The results of job and task analysis can improve human resource management. However, the determination of the best method must rely primarily on the needs of the user organization.

Literacy Task Analysis - A Definition

Literacy task analysis is the defining of the literacy elements required to do specific jobs. It is a relatively new field which has sprung from the interest in literacy and has emerged from the Job Partnership Training Act (JPTA) and other legislated initiatives aimed at promoting greater efficiency by the American workforce. Literacy task analysis is similar to traditional task analysis with one important difference. It analyses the job tasks which require reading, writing, computation, problem solving skills and other basic skills. From that analysis, training needs can be identified for persons already in the jobs, along with assessment instruments for entry level staffing. It should be noted that literacy task analysis

is a tool which can be used by a wide range of stakeholders - by employers, by unions and by educators or other practitioners who have been invited into the workplace. The benefits of literacy task analysis are not only to employers, union administrators and trainers but most importantly to the workers themselves.

As with job and task analysis, a literacy task analysis can serve several purposes. As Drew and Mikulecky (1988) point out, sometimes damaged products or personal injury on the job are signals which may point to a lack of adequate basic skills by one or more employees. The purpose of a literacy task analysis, therefore, would be to discover training needs for such employees.

A second purpose for conducting a literacy task analysis is promotability. Employers often report that they have reliable workers who demonstrate desirable employability traits such as positive attitude, punctuality and sensitivity, but who lack the basic skills required for higher level jobs. Conducting a literacy task analysis of these higher level jobs will enable analysts to develop materials that will better prepare these employees for promotion to better jobs. In addition, transferability is one of the most important purposes of literacy task analysis. By identifying the literacy requirements of various jobs, a "gap analysis" exercise can take place to identify the added skills a worker would need to acquire in order to move from his/her present job to another job in the company.

Jobs that require retraining of workers are another good target for literacy task analysis. With accelerating technological change many employees are now required to learn how to operate highly technical equipment or to master sophisticated processes. By conducting a literacy task analysis, analysts can develop training materials that integrate the basic learning skills required for retraining with new job tasks.

A fourth purpose for conducting literacy task analysis is to improve specific tasks in which workers make repeated mistakes. By observing workers on the job and questioning workers and supervisors, analysts can determine the basic skills deficiencies and provide materials for literacy training for individuals or groups of employees.

As with job and task analysis, there are several ways of performing a literacy task analysis. Carnevale, Gainer and Meltzer (1988) have developed the components of a generic task analysis process for individual jobs or job families. The steps include:

1) selecting the jobs to be analyzed
2) developing a preliminary list of duties and tasks performed on the job (to be analyzed focusing on Basic Workplace Skills)
3) reviewing, refining and revising the preliminary list of skills using expert committees

4) verifying the skills necessary for the job with company employees
5) detailing the basic workplace skills required for each task selected for inclusion in the training program.

The authors suggest that the results of this type of analysis lay the foundation for a good instructional program.

Mikulecky (1985), Drew and Mikulecky (1988) and Askov (1989) have also outlined the following steps in conducting a literacy task analysis.

1) choosing and scheduling site visits
2) interviewing professional staff and going on site tours
3) selecting workers to interview and observe as they perform basic skills tasks
4) gathering literacy materials, and
5) developing instructional materials, including simulations adapted to workers' needs.

Current practice in conducting various forms of literacy task analysis seems to suggest that by observing and interviewing workers and examining job-related printed materials instructors will be better able to understand the demands of the job, thus allowing them to teach the basic skills required for those jobs. Although an instructor must be familiar with a worker's job, it is not the job task which is taught but the basic skills a worker

needs in order to accomplish the job. As Philippi (1988) notes, the job materials merely serve as a vehicle for teaching such elements as the reading processes required on the job.

Laudable attempts have been made by researchers and practitioners to document and use the results of a literacy task analysis in order to improve instructional design. These experts have shown that methods used for general job and task analysis can be applied to literacy task analysis. Presently, the most common use of the literacy task analysis results are instructional simulations and sample activities. As Askov (1989) points out, teachers and trainers can maximize instruction by tapping the job content knowledge of experienced workers and developing an occupation-focused curriculum which becomes the core of a workplace literacy program.

The next chapter of this report will set the scene for a literacy task analysis in several key sectors of the Canadian workforce. Building on the research base which has been described, the stage is now ready for a description of how actual literacy task analysis techniques were applied to selected workers in the automotive repair, retail and construction sectors.

Chapter 3

A PRELIMINARY ANALYSIS

In the full Technical Report the third chapter *Applications of the Literacy Task Analysis* will be presented in a simple case study format. For each literacy task analysis conducted with an employee in the automotive repair, retail and construction sectors, information will be discussed under the following categories: Background of the Workplace, Design of the Analysis, Data Collection, Interpretation of Results and Strategies for Developing Training Materials. Within the three sectors the types of employees who have or will participate in this project include a motor vehicle repairer, a grocery store receiver, a bakery clerk, a grocery assistant manager, a butcher-in-training, a crew supervisor of meat packers, a pre-cast repair and cleaning labourer and a cement finisher. Using a case study approach will provide the fundamental information for the development of the Literacy Task Analysis Training Manual.

Specifically, in the section Background of the Workplace a brief discussion will highlight such information as size of company, union or organization, number of employees, type of service or product delivered, qualifications of employees and other historical facts that will help provide the backdrop for the literacy task analysis. The Design of the Analysis section

will give an overview of the approach used in the literacy task analysis along with the rationale for selecting the different techniques and methods for the sector and type of employee. In the Data Collection part of the case study time frames, procedures and types of methods and techniques used will be discussed. In addition, an evaluative statement will be made as to the appropriateness of using these data collection methods with certain types of jobs. The Results of the Analysis section will present the findings from the completed literacy task analysis exercise. It will summarize the information gathered from the different methods and techniques and will describe the job tasks in terms of the Workplace Basic Skills Profile. The final part of the case study will identify the key ways of using the results of a literacy task analysis to develop specific training programs and materials.

For the purpose of this *Interim Report* three case studies are presented as a part of the preliminary analysis - Motor Vehicle Repairer, Grocery Store Receiver, and Pre-Cast Repair and Cleaning Labourer. Although these examples are not complete on all dimensions they provide a flavour of some of the more common methods used for a variety of human resource planning and training needs. Even at the early stage of this analysis it appears that by drawing from the vast knowledge base of job and task analysis, significant contributions can be made for improving literacy task analysis procedures. As the reader will

observe modifying approaches, techniques and methods from the larger domain provide both practical and specific results for improving job training.

CASE STUDY 1

Motor Vehicle Repairer - Automotive Repair Service Sector

WORKPLACE BACKGROUND

The Motor Vehicle Repairer who participated in this literacy task analysis is a licensed journeyman. He worked in a small car care business with six other employees and the owner, who is the president of the company. The business which was started in 1972 offers a complete automotive repair service in both electrical and mechanical and specializes in preventive maintenance. After a car has been serviced a history of the repairs is recorded and the customer receives a regular notice outlining the functions and car parts that will require attention in the future. The company hires employees at the apprenticeship and licensed journeyman levels to work at the 15 bays. In this company, which is representative of the many smaller repair shops, working with the customer is considered to be a vital competency. All apprentices are working towards a journeyman certificate and the licensed technicians are involved in continuous upgrading courses offered through the local Industrial Training Council and other professional training services. For a number of years, the owner

of the company has provided community leadership in updating training programs for both apprentices and journeymen and has participated in previous occupational curriculum projects funded by the Ontario Ministry of Skills Development.

DESIGN OF ANALYSIS

The basic steps in performing the literacy task analysis included the following:

1) Observation Interview
2) Task Matrix Technique
3) Basic Task Description Technique
4) Task Criticality
5) Learning Objective Technique

The approach used in conducting the task analysis involved a process which broke down the whole job into component parts. The first step in the process was to find out what the actual job entailed. This was done through the OBSERVATION INTERVIEW. Second, the analyst outlined the competencies required of the main job duties using the TASK MATRIX TECHNIQUE. This resulted in a definition of the job and task statements. Next, the BASIC TASK DESCRIPTION TECHNIQUE was used to detail the tasks and analyze for sequence, relationship and other details. A brief TASK CRITICALITY exercise was then performed on the different task elements. The final step in analyzing the job was to suggest ways of learning the most critical tasks, skills and

knowledge associated with performance of the targeted duties. This was done through the LEARNING OBJECTIVE TECHNIQUE.

DATA COLLECTION

Initially the employer of the company was interviewed in order to identify the master performer who would participate in the literacy task analysis case study. Questions used during this interview are found in Figure 2. The information obtained during this interview provided a good background of the work environment, main duties and competencies of the job as perceived by the employer and highlighted the critical areas to be discussed with the master performer.

A week later the analyst interviewed the master performer in the company office using a modified version of the employer interview form. During the 30 minute conversation, the motor vehicle repairer described the main duties of his job, the percentage of time spent working on those duties and the types of skills used to work effectively on the job. A preliminary attempt was also made to have the master performer describe some of the basic workplace skills used in performing his main job duties. Also during this time, a tentative schedule for observing the targeted duties was arranged. It was decided that two types of main job duties would be useful to observe. In an average week, approximately 80% of the technician's time was spent in performing electronic tune-ups and repairing brake problems.

FIGURE 2

Employer Questions for Selection of Master Performer

1. What is the job title of the selected employee? Actions performed? Objects used?

2. What are the main duties of the job?

3. Are there new systems, procedures or responsibilities on the job?

4. Are there difficulties experienced by present employees due to a deficiency in literacy-related skills?

5. Are there procedures not fully or correctly utilized?

6. Have there been accidents or legal liabilities due to a deficiency in literacy-related skills?

7. Does your company have a sufficient pool of qualified workers?

Within the next two weeks the master performer was observed for three hours while working on an engine tune-up and for three hours while repairing a brakes malfunction. The analyst used the OBSERVATION INTERVIEW, which entailed both observation and subsequent questionning in order to obtain further information on the tasks being carried out. This was done while the worker was performing his duties. During the observation, the analyst made special note of all of the specific basic workplace skills used by the master performer. After each observation period, the analyst wrote up the observation notes which were used as a source of reference in the next step of the analysis.

The information gathered was then categorized using the TASK MATRIX TECHNIQUE. The technique helps arrange the observed actions or competencies of the master performer in relation to the targeted duties. This data collection method resulted in a job description and the development of task statements which were both verified with the master performer. The next step in the analysis was to describe exactly how the two major duties were performed by breaking down the task statements. Sequence, relationship and other details of the tasks were analyzed using the BASIC TASK DESCRIPTION TECHNIQUE. This method of collecting data is used to record the steps or elements in a task along with related information like specific workplace basic skills. After each task statement was detailed, the master performer rated the frequency importance and difficulty in learning each of the major

tasks. This exercise called TASK CRITICALITY provided the focal points for using the LEARNING OBJECTIVE TECHNIQUE, which is the key to developing a potential training program. This technique is used to define the skills and knowledge needed to perform tasks. It provides observable and measurable criteria for correct performance. It should be noted that in this case study, the development of additional employee training was not one of the project goals. However, the LEARNING OBJECTIVE TECHNIQUE was used here to simply illustrate the ease in which an analyst can use the results of a literacy task analysis towards the actual implementation of training.

RESULTS AND INTERPRETATION OF ANALYSIS

The information gathered through the OBSERVATION INTERVIEW enabled the analyst to use the TASK MATRIX TECHNIQUE. As indicated in Figure 3 four targeted duties were arranged in relation to competencies. In this case, competencies refer to the skills, abilities and knowledge required to succeed on the job. The seven competencies - assessing, diagnosing, estimating, communicating, planning, repairing and evaluating - were crucial to performing each of the major job duties. Since the analyst observed the performance of the first two duties, only those are "X"ed. From this data collection form, the following job description was developed.

FIGURE 3

Task Matrix - Motor Vehicle Mechanic

	Competencies						
Targeted Duties	**Assess**	**Diagnose**	**Estimate**	**Communicate**	**Plan**	**Repair**	**Evaluate**
Electronic Tune-Ups	X	X	X	X	X	X	X
Brakes	X	X	X	X	X	X	X
Steering							
Transmission							

MOTOR VEHICLE REPAIRER

The Motor Vehicle Repairer is a licensed journeyman who is able to repair both electrical and mechanical car problems. The individual is responsible for assessing, diagnosing and estimating costs for problems associated with electronic tune-ups, brakes, steering and transmissions. He is able to communicate with customers, plan the operations required for each job and to repair the malfunction in a proper order so that work can be evaluated according to written specifications.

From the completed task matrix, task statements were written. To illustrate this exercise, task statements were developed for the main duties of electronic tune-ups and brakes. These statements are presented below in Figure 4. Both the task statements and the job description were verified with the master performer before detailing the task steps.

FIGURE 4

Task Statements

1.0 ELECTRONIC TUNE-UPS

- 1.1 Assess engine malfunction
- 1.2 Diagnose engine problem
- 1.3 Estimate costs
- 1.4 (a) Communicate problem to customer
- 1.4 (b) Communicate costs to customer
- 1.5 Plan operations
- 1.6 Repair malfunction
- 1.7 Evaluate repair

2.0 BRAKES

- 2.1 Assess brakes problem
- 2.2 Diagnose brakes problem
- 2.3 Estimate costs
- 2.4 (a) Communicate problem to customer
- 2.4 (b) Communicate costs to customer
- 2.5 Plan operations
- 2.6 Repair brakes malfunction
- 2.7 Evaluate repair

In using the BASIC TASK DESCRIPTION TECHNIQUE, each task statement for the targeted duty was broken down into smaller units called task elements and specifically analyzed for the

basic workplace skills and knowledge requirements. For example, the task "assess engine malfunction" was further detailed into (a) read job order and (b) test drive car. In terms of skill analysis, reading the job order form required the master performer to know and comprehend the vocabulary used to describe the malfunction. This type of detailing and analysis was performed for each of the task statements of the targeted duty electronic tune-up only. The results are presented in the following chart.

JOB: MOTOR VEHICLE REPAIRER

Targeted Duty: 1.0 Electronic Tune-Up

Task: 1.1 Assess Engine Malfunction

Task Element	Workplace Basic Skills & Knowledge
1.1 (a) Read job order	* know and comprehend vocabulary used to describe malfunction on job order form
1.1 (b) Test drive car	* listen and note possible malfunctions listed of not listed on job order

Task: 1.2 Diagnose Engine Malfunction

Task Element		Workplace Basic Skills & Knowledge
1.2 (a)	Perform an ALLTEST	* connect appropriate probes to engine parts
1.2 (b)	Read results from scope sheet	* know and understand codes and numerical values
1.2 (c)	Check spark plugs, distributor cap, wires, air filter, fan belt	* decide which part to check first * verify results from scope sheet by checking designated parts * detect signals for wear on parts

Task: 1.3 Estimate Cost

Task Element		Workplace Basic Skills & Knowledge
1.3 (a)	Locate parts and price from catalogue	* refer to appropriate catalogues and sections, locate information and prices and write information on job order
1.3 (b)	Estimate parts and labour costs	* calculate estimation

Task: 1.4 Communicate with Customer

Task Element		Workplace Basic Skills & Knowledge
1.4 (a)	Call customer	* use effective telephone skills
1.4 (b)	Explain mechanical problem	* translate mechanical problem into "layman's language"
1.4 (c)	Answer customer questions as to why and how the problem occurred	* ask probing questions to ensure customer's understanding
1.4 (d)	Give estimation and obtain approval to do repair	* speak clearly * ask questions directly

Task: 1.5 Plan Operations

Task Element		Workplace Basic Skills & Knowledge
1.5 (a)	Sequence repair activities mentally	* establish priority for conducting repair * decide most effective way for completing repair
1.5 (b)	Estimate time for each activity	* allocate a given amount of time to perform each activity
1.5 (c)	Order parts from distributor	* give accurate information
1.5 (d)	Select proper tools	* decide on which tools to use

Task: 1.6 Repair Malfunction

Task Element		Workplace Basic Skills & Knowledge
1.6 (a)	Refer to specifications	* locate specifications guide on hood or in Chilton Repair Manual * compare specifications with completed repair
1.6 (b)	Perform operations in proper order	* follow repair plan * check for care of equipment * check for workplace hazards
1.6 (c)	Complete repair	* evaluate time schedule * track results after each activity * communicate activity level and progress with other employees

Task: 1.7 Evaluate Repair

Task Element		Workplace Basic Skills & Knowledge
1.7 (a)	Test drive car	* listen and note how corrected repair functions * show information on job order form

As can be seen from the results of the literacy task analysis specific competencies from each of the five major skill

categories were required to perform the targeted duty of engine tune-up. Once again the Basic Skills categories included: literacy and numeracy skills, listening and communication skills, creative thinking and problem solving skills, personal management skills and teamwork skills. In the next step of the analysis the master performer was requested to rate the frequency, importance and difficulty in learning each of the major tasks. This exercise was called TASK CRITICALITY. The rating scale values for each question ranged from 1 (very frequent) to 7 (most frequent) respectively. Results from this exercise indicated that (a) all tasks were most frequently required, (b) all tasks were critical and (c) two tasks were most difficult to learn. Those tasks were diagnosing the engine malfunction and communicating with the customer. Since both of these tasks were also rated as most frequently required and critical to performance, they could become the key areas for engine tune-up training development. In addition the completed workplace basic skills analysis can provide other target areas for training depending on the needs, circumstances and available funds of the company.

In applying the LEARNING OBJECTIVE TECHNIQUE to the "difficult to learn" tasks, the analyst uses the results of the analysis to write measurable learning objectives. For example let's take the task of "Communicate with Customer". The analyst along with the master performer and employer uses the five

specific skills to develop performance objectives. Again the five specific workplace basic skills and knowledge included:

* use effective telephone skills
* translate mechanical problem into "layman's language"
* ask probing questions to ensure customer's understanding
* speak clearly
* ask questions directly

This process entails writing terminal objectives, enabling objectives and entry behaviours for the different competencies. The information is crucial for specifying and testing performance in the designated training area. Once the objectives have been written the actual materials used in performing the task can be used to further develop the job-specific training curriculum. A more complete version of this process will be illustrated in the Literacy Task Analysis Manual.

CASE STUDY 2

Grocery Store Receiver - Retail Sector

BACKGROUND AND DESIGN OF ANALYSIS

The Receiver in a grocery store, as the title indicates, is responsible for receiving virtually every article for the store. This is a key job, for without the receiver, stores would have empty shelves or a chaos of boxes in the back room. A literacy task analysis was performed on this job using the interview note

technique and observation, with additional elements from the job function and risk assessment techniques. A brief description of these tools are presented here to assist the reader in understanding how they are actually applied when conducting the literacy task analysis.

The Interview Note Technique

The Interview Note Technique is one of the most common approaches to job and task analysis. It is, essentially, an interview with the master performer, during which the analyst records tasks and sub tasks, with particular attention to those which are central to the job's purpose. This technique is useful in establishing what tasks are significant, but it can in no way stand alone as task analysis owing to its limitations. It's major limitation is that, if not married to actual observation of the master performer, it tends to be very subjective.

The Job Function Technique

The Job Function Technique identifies job functions, and categorizes them as they relate to information, people and things. An information function, for example, could involve compiling or analyzing reports. A people function could be supervising or assigning duties, while a things function could be operating a machine. A strength of this method is that it requires the master performer to think of the job as it pertains to very specific areas. This could be important if a reason for

the analysis was to determine the balance between technical and machine functions and people oriented functions. However, if this particular breakdown was not considered relevant, this technique has no advantage over others.

The Risk Assessment Technique

The Risk Assessment Technique is used after the task statements have been itemized using one of the above methods (or others not outlined here). The importance and difficulty of each task is graded on a scale of 1 to 5. This technique assists the analyst to focus the training design on the most important tasks. A failing, however, is the subjectivity of the scale ratings.

The techniques identified above permit the analyst to obtain a description of the targetted position based on an interface between the master performer and one of the methods outlined. But, the truest technique of all is job observation. Job observation has the advantage of allowing the analyst to actually see the elements of the job rather than learning of them second hand through interviews or collection of materials. It is, however, very time consuming, and needs to be conducted in such a way as to minimize disruption of the employee's work.

DATA COLLECTION

You will recall that the interview-note technique is essentially an interview with the master performer, during which

the analyst records tasks and sub-tasks, with particular attention to those which are central to the job's purpose. This technique was married to actual observation to remove the subjectivity of the master performer's comments and to ensure that no major elements had been missed. Four major functions were identified from the interview notes and the observation, each with a number of tasks. These are presented in Figure 5.

FIGURE 5

RECEIVER - GROCERY STORE

Major Task Elements and Sub-Tasks

1.0 RECEIVE MERCHANDISE

1.1 Open doors for reception of goods and greet driver

1.2 Verify what shipment is being received

1.3 Direct driver to location for off-loading merchandise

1.4 Count cases and boxes on skids to verify quantity received

1.5 Make inquiries to clarify discrepancies between expected order and order received.

1.6 Sign invoice for quantities received

1.7 Place invoice in collector bin for accounts

1.8 Farewell to driver and close doors

2.0 ARRANGE FOR RETURNS AND STORE TRANSFERS

2.1 Identify problems calling for transfer of merchandise from store. For example, time dated products, over-ordered or slow selling specials and defective materials received.

2.2 Phone Toronto to obtain work order number

2.3 Indicate quantities and what was sent back on work order

2.4 Call driver for pick up of "to be returned" articles

2.5 Sign work order form indicating credit to be received

2.6 Put form in bin for collection by accounts

FIGURE 5 (CONTINUED)

3.0 ENSURE MOVEMENT OF MERCHANDISE

3.1 Load soft drinks onto trolley and place on shelf on store floor

3.2 If other merchandise not moving out fast enough through clerks, bring to attention of Grocery Manager

3.3 Arrange for pick up of soft drink empties

4.0 KEEP RECEIVING AREA CLEAN AND WELL ORGANIZED

4.1 Place boxes left by night crew in compactor each morning

4.2 Compact boxes

4.3 Tie compacted boxes ready for pick up by recycler

4.4 Place boxes in compactor after each order has been unloaded during the day

4.5 Ensure that materials are unloaded in appropriate spots so that major work area is clear of clutter

4.6 Wash floor at least once a day

4.7 Ensure that store employees dump unloaded boxes in designated places

If one took a narrow view to literacy task analysis, one would work with invoice forms, limited calculations of basic mathematics, and how to fill out work orders. If one takes a broader view of literacy task analysis, however, the skills which could be viewed under the headings of Basic Listening and Oral Communication, Creative Thinking and Problem Solving, Personal Management, and Teamwork are also appropriate to use in building literacy training materials. As a matter of fact, since the job of receiver is fairly light on the reading, writing and computation side, these other skill areas become important in building an effective training curriculum which will be relevant to the employee as the receiver and will also be relevant to him if he is trying to improve his reading, writing and computation skills in order to be considered for another job within the store or elsewhere within the food industry.

Another technique used in the literacy task analysis for the Receiver was the Job Function Technique. As previously described it provides standardized categories which can be used to identify and organize specific tasks. These categories are INFORMATION FUNCTIONS, PEOPLE FUNCTIONS and THINGS FUNCTIONS. Using this technique the analyst can apply these categories to the job functions which have identified through interview and observation. Information functions include: comparing, copying, computing, compiling, analyzing, innovating, coordinating, and synthesizing. People functions include: instruction taking,

helping, serving, exchanging information, coaching, persuading, diverting, consulting, instructing, treating, supervising, negotiating, and mentoring. Thing functions include: handling, feeding, offbearing, tending, manipulating, operating-controlling, driving-controlling, precision working and setting up.

The functions listed are by no means exhaustive, and one could add functions to the three categories. Applying this process to a particular job can lead to some useful insights. For instance, it would be easy to conclude that the job of the Grocery Store Receiver is basically a "things" job. After all, on the surface it appears to be a job where the main interface of the worker is with merchandise. The employee works out of the loading docks and reception area, and basically runs a one person show. He has neither staff nor adjacent co-workers. Yet when one looks at the sub-tasks of the major task element, it becomes clear that his interface with any number of delivery truck drivers is critical to the successful operation of this major task. Indeed, 5 of the 8 sub-elements of the task "receive merchandise" involve liaison with deliverers. The people function is perhaps THE central facet of the job. The people functions of exchanging information, helping, and negotiating become every bit as important as the things functions of handling and manipulating.

After the interview and once the task elements have been identified and written up, one can go back to the master

performer and ask him to rate the task statements according to level of difficulty and importance. (Risk Assessment Technique). This will be easier for a master performer to identify if the job has many dimensions than if the job has few major task elements. This information can be important to the analyst in determining areas of concentration for the preparation of training materials.

INTERPRETATION OF RESULTS WITH FOCUS ON BASIC WORKPLACE SKILLS

This information provides a number of interesting elements for the analyst. One can conclude, for instance that: (a) there is a very limited amount of reading, writing and computation (the traditional literacy skills) required to do this function and (b) there is, on the other hand, a fairly high degree of interpersonal contact going on. The rapport which the receiver establishes with any number of drivers of delivery trucks (possibly 20 or more drivers a week) is crucial to the success of the job. This has implications when designing training materials for a receiver based on literacy task analysis, since simulations could be developed for both situations.

If one reviews the other main functions of the Receiver position, one can identify more tasks with traditional literacy elements, such as writing up work orders for merchandise which must be returned, and, tasks calling for other skills such as time and space management, and effective interpersonal relations both with outsiders and insiders such as drivers and clerks in

the store who are vital in getting the merchandise out on the floor under the receiver's direction.

USING FINDINGS FROM LITERACY TASK ANALYSIS TO DEVISE TRAINING MATERIALS

Literacy task analysis can provide a useful aid in the preparation of training materials for job incumbents and for prospective entrants to the job. In the case of the receiver, for instance, training materials could be devised which build writing skills simultaneously with problem solving skills. The following example shows how this would work in practice.

An exercise could be devised in which the trainee is faced with a number of decisions on how to order his work. He could be given choices, and asked (both orally and in writing) to justify those choices.

For instance, the day receiver will:

- receive load from bread truck which is waiting
- package paper boxes from night shift
- move coke cases out onto the floor
- clean floor
- obtain work order to return over-ordered specials (by phoning Toronto)

The ordering will reflect a logic. For instance, the receiver will not receive new loads until he has first put old boxes into crusher and tied them neatly for collection. He will receive bread truck order only after he has made room by ridding area of voluminous cartons. Next, logically, he will obtain a

work order to return over-ordered specials, since it is important to move these items out of the store as quickly as possible, and he will have to have the work order number ready at hand when the supplier comes for pick up. Next, he will move coke cases out on the floor - once again, clearing space, but doing this only after the more urgent items have been attended to. And, finally, he will clean the floor (a necessary task but one that can wait until more urgent tasks have been attended to.)

The employee, in working his way through these priorities, can be asked to justify his choices in writing. When he does so the trainer will be able to assess two aspects: 1. the logic of the employee's problem solving and 2. the strength of the employee's writing skills. If a spelling problem is evident, for example, it may help to review job specific vocabulary and various rules of word formation. If sentence fragments are abundant, it could help to review the parts of a sentence and how to identify them. Whatever writing problems the employee has will probably emerge as the employee works his way through the problem solving exercises.

In addition, problem solving/prioritizing exercises can help build oral skills and teamwork if workers are asked to discuss their approaches to problems and reach a consensus on action. The trainer will perform the role of facilitator. Many workers will not have had the experience of organizing thoughts orally and communicating them to co-workers. Exercises on cause and

effect, on seeing relationships between seemingly unconnected pieces of information and on drawing conclusions will all be helpful in making the worker a more skilled communicator and a more effective team player. These exercises will grow out of the knowledge of the job gleaned through literacy task analysis. More detailed examples will be provided in the Manual.

LESSONS LEARNT FROM THE LITERACY TASK ANALYSIS

The Factor of "Prior Knowledge"

There is one major complication to task analysis. When you conduct a task analysis, it is difficult to assess prior knowledge of the employee. For instance, if you were observing a plumber, and saw him or her carrying out various functions, it may not occur to you that many of the decisions made in doing the job are based on prior learning. Knowledge of measurement and pressure may be an essential part of a plumber's trade, yet an analyst observing this work may never be able to assess just how much that knowledge determined the various choices made when making decisions about tasks.

This problem is particularly acute when one conducts a LITERACY task analysis for entry level employees, many of whom have low basic skills. The entry level employee may have more difficult reading tasks to do than a more seasoned employee. The experienced employee, for instance, will only need to glance at a

chart or diagram to verify one piece of information, whereas an entry level employee will need to laboriously digest the complete document, and refer to it often as he moves through tasks.

When you observe a master performer, who has long since mastered the intricacies of many procedures, it can give a false idea of reading, writing and computation requirements for a new employee aspiring to the position of the master performer. The important thing to do is to keep in mind this aspect of task analysis, and be aware of the fact that observing the master performer does not give you the complete information you need to design appropriate training materials for a new employee. It does, however, give you a considerable part of what you need.

Observing the Master Performer

There are many benefits of observing the master performer when conducting a literacy task analysis. First observing a person who is considered extremely adept at a job will help to reveal the competencies required to do the job. If, on the other hand, you observe a less proficient employee, you may miss some important elements of the job. In, other words, you want to ensure that ALL elements of the job are identified. Second the master performer will generally be a good source of information about the job. If the individual is doing the job so proficiently, it makes sense to assume that he or she has done considerable thinking about the job and its various elements.

Third since the master performer is generally well respected, analysis based on your interactions with this person will probably be respected too.

Problem With Observing the Master Performer

Because of the prior knowledge that has helped the master performer to do the job so well, the individual may take short cuts - either mental or physical - in performing tasks. This may be a disadvantage to an analyst who is trying to identify all the job elements with a view to designing training materials. The master performer, because the job has come to fit him or her like a glove, may not be able to distinguish easy elements of the job from more difficult elements. The "It's ALL easy!" syndrome may surface in your interview with the master performer, even though it's evident on observation that skills of varying complexity are required to do the various tasks.

Despite these problems, interviewing and observing a master performer is a useful approach in literacy task analysis. In order to give some perspective to the problem of assessing the role of "prior knowledge" which is not evident in the observation, it may be useful to look at the Threshold Traits Analysis System as described by Sidney Gael. In the Technical Report this method will be used when conducting a literacy task analysis on the job of Bakery Clerk. However for this Interim Report a description of the method is simply outlined to

illustrate how problems observing a master performer can be overcome.

The Threshold Traits Analysis System makes a distinction between knowledge and skill. Knowledge represents a person's retrievable information, involves only the brain and the central nervous system and is acquired physically by study. Skill, on the other hand, represents a psychomotor activity, involving both body and brain and is acquired only by practice. The Threshold Traits Analysis System utilizes thirty-three co-efficients to describe the system. The co-efficients are divided into the five following categories: physical, mental, learned, motivational and social. While all five categories are essential in performing a job in the optimum way, categories TWO, THREE and several elements of FOUR are the most relevant to literacy task analysis. Co-efficients for these three categories appear in Figure 6.

In literacy task analysis, categories TWO, THREE and parts of FOUR become vital aspects in the analysis. Taken together, they present a broad rather than a narrow definition of literacy. It is important that the employer or union whose employee or member you are observing know that you are looking at these broad aspects of literacy rather than the more limited aspects of merely the mechanics of reading, writing and computation. Training materials that deal with mental functions such as Comprehension and Problem-solving, and with the more

sophisticated Learned functions such as Planning and Decision Making will be more useful in the workplace than those dealing with more limited aspects. Keeping these co-efficients in mind will assist you in conducting your literacy task analysis in the workplace.

FIGURE 6

Threshold Traits Analysis System:
Co-efficients Relevant to a
Literacy Task Analysis

MENTAL

6. Perception
7. Concentration
8. Memory
9. Comprehension
10. Problem-Solving
11. Creativity

LEARNED

12. Numerical Computation
13. Oral Expression
14. Written Expression
15. Planning
16. Decision-making
17. Craft Knowledge
18. Craft Skill

MOTIVATIONAL

19. Adaptability - Change
20. Adaptability - Repetition
21. Adaptability - Pressure
22. Adaptability - Isolation
23. Adaptability - Discomfort
24. Adaptability - Hazards
25. Adaptability - Dependability
26. Control - Perseverance
27. Control - Initiative
28. Control - Integrity
29. Control - Aspirations

CASE STUDY 3

Pre-Cast Repair and Cleaning Labourer - Construction Sector

BACKGROUND

The third example presented is the job of pre-cast repair and cleaning in the construction industry. This job is one of the more skilled jobs within the many jobs done by labourers. The pre-cast repair and cleaning function is becoming increasingly important in the construction industry because of the growing preference for pre-cast finishings on buildings instead of the more labour intensive and time consuming brick or cut stone which were once the standard finishes. The use of pre-cast concrete with various aggregate design and colour features is especially popular in the industrial and commercial building sector.

A major element of pre-cast repair is to establish the correct mixture of water, cement and aggregate to obtain a repair that will blend with the surrounding unrepaired surface, while cleaning requires a good knowledge of the appropriate dilution levels of the chemicals used. Because of the increasing use of pre-cast, workers trained in this area are able to access jobs specifically devoted to this specialty. It is thus seen as a desirable job for a labourer - one which could lead to mobility within the labourer occupation and the avoidance of some of the less interesting and more unskilled jobs within the labourer category.

The analysts wish to thank Locals 183 and 506 of the Labourers' International Union of North America for their generous giving of time and information so that this part of the study could be completed.

DESIGN OF THE ANALYSIS

The Job Learning Analysis Method described in Pearn and Kandola (1988) was applied to the pre-cast repair and cleaning labourer job. This method describes jobs in terms of learning skills which contribute to the satisfactory performance of the job. A learning skill is defined as one that is used to increase other skills or knowledge. For example we can improve our ability to observe and ask relevant questions, assess our mistakes and memorize. The learning skills represent broad categories of job behaviour which need to be learnt. These skills include:

1. Physical skills, that is activities that require practice and repetition in order to get right, become fast enough, or minimize errors. They do not include activities which are simple procedures and can be performed easily from written or oral instructions.

2. Complex procedures, sequences of activity or procedures which are: (a) remembered, memorized, or (b) followed with the aid of written material or other aids.

3. Checking, assessing, discriminating, that is: non-verbal information which is received by jobholders through their senses (sight, sound, smell, taste, touch) and which is used to make judgements or take some other action, and which usually takes practice to get right.

4. Memorizing facts, information, that is: (a) information that has to be retained in one's head and recalled for brief periods of time, or (b) information that has to be learnt, retained and recalled for a period greater than one day.

5. Ordering, prioritizing, planning, that is: the extent to which the jobholder has any responsibility for, and flexibility in, determining the way a particular job activity is performed.

6. Looking ahead, anticipating, that is: the jobholder can foresee problems and take some action which might prevent or at least reduce the effects of a problem or fault as well as meeting needs in advance.

7. Diagnosing, analyzing, solving, that is: the extent to which the jobholder sorts out problems (a) without assistance, or (b) with assistance such as manuals, other people.

8. Interpreting or using written, pictorial, diagrammatic material, that is: the extent to which written materials, manuals and other sources of information (diagrams, charts) need to be used/consulted in order to learn the job.

9. Adapting to new ideas, systems, that is: the extent to which the jobholder is required to adapt to or learn new ideas, equipment, methods by using manuals or other written materials, or using other sources of information. (Pearn and Kandola, 1988, pp. 45-46)

DATA COLLECTION

The analyst performed a three step process in applying the Job Learning Analysis Method. First the analyst met with the trades instructor who was teaching the pre-cast repair and cleaning course to a class of twelve labourers. These labourers varied in experience and ethnic background, with most of them being Canadian born. On average, workers in this course had from three to five years of experience in the construction field.

While the class was on coffee break, the instructor reviewed the course content with the analyst, with particular attention to the kinds of reading and writing requirements the workers would encounter on the course. Student workbooks were examined to establish the degree of ability to take notes on content presented. While significant spelling difficulties came to light, every student was able to note-take to some extent.

Second, the analyst observed the workers doing practical work on pre-cast repair. Various difficulties which the workers might experience in carrying out an effective repair were discussed. This observation took about one half hour. Third, after lunch, the analyst utilized the Job Learning Analysis Scoring Grid to obtain a snapshot of the main tasks of the pre-cast repair/cleaning job, and how they rated in regard to the nine skill areas identified in this method. The Scoring Grid appears in Figure 7.

As a result of this exercise seven main activity dimensions for this job were recorded. These included:

1. Identify defects in pre-cast concrete.
2. Mix proper mixtures and combinations of mixtures to effect repairs, and apply them.
3. Measure joins between sections of pre-cast.
4. Set up swing stage to specified length as required in order to perform tasks.
5. Utilize correct safety procedures in regard to all work carried out.

LEARNING CATEGORIES MAIN ACTIVITY No. Description		TIME SPENT ON ACTIVITY	PHYSICAL SKILLS	COMPLEX PROCEDURES	CHECKING/ASSESSING/ DISCRIMINATING	MEMORIZING FACTS/ INFORMATION	ORDERING/PRIORITIZING/ PLANNING	LOOKING AHEAD/ ANTICIPATING	DIAGNOSING/ANALYZING SOLVING	INTERPRETING/ USING WRITTEN-PICTORIAL DIAGRAMMATIC MATERIAL	ADAPTING TO NEW IDEAS/SYSTEMS
1.		1	2	3	4	5	6	7	8	9	
2.		1	2	3	4	5	6	7	8	9	
3.		1	2	3	4	5	6	7	8	9	
4.		1	2	3	4	5	6	7	8	9	
5.		1	2	3	4	5	6	7	8	9	
6.		1	2	3	4	5	6	7	8	9	
7.		1	2	3	4	5	6	7	8	9	
8.		1	2	3	4	5	6	7	8	9	
9.		1	2	3	4	5	6	7	8	9	
10.		1	2	3	4	5	6	7	8	9	

Figure 7 The Job-Learning Analysis Scoring Grid

Source: Pearn, M. and Kandola, R. (1988). Job Analysis - A pratical Guide for Managers. Institute of Personal Management. Wimbledon, London. p.49.

6. Identify areas where pre-cast cleaning is required and apply necessary amounts of cleaner which consist of muriatic acid and deox.

7. Use extension ladders properly.

Activity Analysis

Once the principal activities were recorded, each main job task was analyzed in more depth. A description of the activity analysis follows.

1. IDENTIFY DEFECTS

The identification of defects is a central aspect of this worker's job. On average, this function would take up 15% of the worker's time. Checking for defects is done visually. The worker has full responsibility in this aspect of the work, and does not have to verify with a supervisor whether the defect identified is serious enough to require remediation.

2. GETTING THE PROPER MIX

The most creative and important part of this worker's job is to establish the correct mixture of water, cement and aggregate to obtain a repair that is not noticeable. This means that the worker will need to assess a number of variables such as: temperature at time of repair, as contrasted to time of original pour, percentage of coloured aggregate to main colour and thickness of surface to be repaired. Most procedures are routine. Written aids regarding number of cups to use, for

instance are used at the beginning and are quickly committed to memory. Memorizing information is necessary on the job, but facts to be memorized are not complex.

Looking ahead to anticipate problems is key to successful performance of this aspect of the job. Judgements must be made as to whether the mixture is correct, and problems are overcome by determining how to avoid a defective mix. This may be done by adding more of a substance. Diagrams, charts or manuals are consulted only infrequently in order to learn the job, and there is no scope for having to adapt to new ideas, since job procedures are well established with few changes over time. This function is practice intensive, with considerable improvement being achieved from continued exposure to different situations, each calling for different mixes.

3. MEASURING JOINTS BETWEEN SECTIONS OF PRE-CAST

What is generally required here is accurate use of the ruler, so that pre-cast slabs are accurately spaced and may be joined at 3/4" intervals. This worker seldom needs to read blueprints.

4. SETTING UP SWING STAGE

Setting up and using the swing stage is an important aspect of this job. On the six week training course, four hours each week is dedicated to the subject of swing stage. Setting up the swing stage is a physical skill. It has a complex set of

procedures with well defined steps. These procedures relate to matters such as: how and where to tie safety lines, use of safety belts, power swing stages versus manual swing stages, understanding weight and balances and setting up of counterweights and outriggers.

This function calls for more reading than most of the other functions. The worker is expected to read the swing stage manual - a book dealing with complex procedures. According to the course instructor, approximately 75% of trainees would be able to read this manual. Memorization of information is essential to the successful set up and use of the swing stage, and the worker has full responsibility and flexibility in determining how the function is to be carried out. This task is done without supervision. Problems with set up and use are sorted out with the assistance of manuals or experienced worker advice. Charts and diagrams are used rarely.

5. KNOWING SAFETY PROCEDURES

Knowledge of safety procedures is obtained through a combination of remembering pertinent facts outlined by the instructor, and referring to written safety documents such as general WHMIS and trades specific safety materials relating to chemicals used in pre-cast cleaning and safe use of equipment.

6. CLEANING PRE-CAST CONCRETE

This is one of the main tasks of the trade, taking up 30% of

the worker's time on average. A physical skill, cleaning pre-cast also relies heavily on foreseeing problems and taking corrective action. For instance, diluting the chemicals 5 to 1 may not be as effective as diluting 10 to 1. Dilution levels will depend on variables, including precipitation, temperature and time of year, both at the time of cleaning and the time of original casting. No manuals exist on procedures for cleaning.

7. USING EXTENSION LADDERS

This is a physical skill, combined with memorizing some key facts of ladder safety. Written materials on ladder safety make extensive use of diagrams and pictures.

Based on this detailed activity analysis it would appear that these seven principal job tasks fall under two main categories. Job tasks 1, 2, 3, 4 and 6 relate to hands-on elements and job tasks 5 and 7 have background and knowledge dimensions.

Detailed Analysis by Learning Category

The final step in the application of the Job Learning Analysis method is to record the results of the main activity description across the nine learning categories in a matrix format as indicated in Figure 8. This exercise will show whether a particular type of learning applies to a specific job task. For example in the pre-cast repair and cleaning job the most

MAIN ACTIVITY No.	Description	TIME SPENT ON ACTIVITY	1 PHYSICAL SKILLS	2 COMPLEX PROCEDURES	3 CHECKING/ASSESSING/ DISCRIMINATING	4 MEMORIZING FACTS/ INFORMATION	5 ORDERING/PRIORITIZING/ PLANNING	6 LOOKING AHEAD/ ANTICIPATING	7 DIAGNOSING/ANALYZING/ SOLVING	8 INTERPRETING USING WRITTEN/PICTORIAL DIAGRAMMATIC MATERIAL	9 ADAPTING TO NEW IDEAS/SYSTEMS
1.	Identify Defects	15%	1	2	(3)	4	(5)	6	7	8	9
2.	Mix and Repair	50%	(1)	(2)	(3)	(4)	(5)	(6)	7	8	9
3.	Measure Joins	MIN.*	1	2	(3)	4	5	6	7	8	9
4.	Set Up Swing Stage	MIN.	(1)	(2)	3	(4)	(5)	6	(7)	8	9
5.	Apply Safety Procedures	MIN.	1	2	3	(4)	(5)	6	(7)	8	9
6.	Clean Pre-Cast Concrete	30%	(1)	(2)	3	(4)	(5)	(6)	7	8	9
7.	Use Extension Ladders	MIN.	(1)	2	3	(4)	(5)	6	(7)	(8)	9
8.			1	2	3	4	5	6	7	8	9
9.			1	2	3	4	5	6	7	8	9
10.			1	2	3	4	5	6	7	8	9

Figure 8 *The Job-Learning Analysis Scoring Grid* Applied to the Pre-Cast Repair and Cleaning Labourer

Source: Pearn, M. and Kandola, R. (1988). Job Analysis - A pratical Guide for Managers. Institute of Personal Management. Wimbledon, London. p.49

* MINIMAL

frequent score obtained occurred in Category number 5 - "Ordering, prioritizing, planning, that is, the extent to which the job holder has any responsibility for, and flexibility in, determining the way a particular job activity is performed". That is to say, six of the seven major work activities related to this category of learning skills. Frequent scores were also obtained in Category number 4 - memorizing facts and information (5 out of 7 activities), and physical skills (4 out of 7). Conversely, low scores were indicated for Category number 9, adapting to new ideas, 0 out of 7, and for the categories relating to checking, assessing, discriminating; looking ahead and anticipating; and interpreting diagrams. We thus have a portrait of the pre-cast repair and cleaning worker. We are able to establish a number of facts from the analysis carried out through the Job Learning Analysis method.

INTERPRETATION OF RESULTS WITH FOCUS ON BASIC WORKPLACE SKILLS

We know, for instance, that the pre-cast repair and cleaning labourer works in an environment where he or she is expected to make independent judgements rather than being always told what to do. We know that physical skills are also important, and that a fair amount of memorization takes place in regard to knowing appropriate mixes of cement, aggregate and water, and accurate amounts of muriatic acid etc. for cleaning pre-cast slabs.

We know as well that this is a job where there is no

significant change taking place, so the worker is not expected to learn new methods or adapt to new ideas on a frequent basis. Nor is the individual called upon to interpret diagrams or charts on a regular basis. This kind of information can be useful to a trainer, since training strategies may be devised which will seek to reinforce the types of learning skills that a particular kind of worker needs. This kind of information is particularly important to a literacy practitioner who is seeking to integrate literacy elements into training.

The literacy practitioner will be examining how to build problem solving skills and creative thinking while at the same time building reading and writing skills. If he or she knows, for instance, that a worker will be required to master various complexities of safety using a swing stage the trainer will examine ways of helping the worker to better comprehension of the swing stage manual. This could involve some of the following components:

1. practice items on how to follow step by step directions
2. memorization techniques
3. cause and effect reasoning
4. how to find what you need in the manual; for example, how to use table of contents, scanning techniques, how to find key ideas, clues for better understanding of work-specific vocabulary, understanding the purpose of various types of reading such as reading to explain "how to", reading to give background information, differentiating between points which will be required frequently in the future and those that need to be read once only.

The trainer, in working with the above components, will be achieving a double purpose. First the worker will be learning more details about the swing stage and second the worker will be learning how to use written material such as manuals, and how to apply certain kinds of reasoning. This will be transferable knowledge.

TRAINING APPROACHES BASED ON RESULTS ON THE JOB LEARNING ANALYSIS METHOD

The application of the Job Learning Analysis Method to the job of pre-cast repair and cleaning yielded some important information about the skills required to do the job and the various aspects of learning which can be applied to those skills. But in order to test the true applicability of the method, it will be necessary to apply it as well to some of the other labourer jobs. Such an approach will lead to establishing some form of comparability between jobs. If we were to end up with a comparison of the learning skills required to do the job of the cement finisher as opposed to the pre-cast repair and cleaning, it would be possible to identify the new skills, both technical skills and learning skills, that must be utilized effectively by the cement finisher. Training can then address the identified gap between the two jobs' skill levels. Literacy training, integrated into the trades training, will be an important part of the required training program to address this gap.

It is important to remember that the labourer job has many facets. An individual may be employed as a form worker, a mason tender or a cement finisher. As well the person may be required to use a fork-lift, and other power tools, cut and core, read blueprints, erect scaffolding, waterproof, excavate, sand blast and wall saw. Training in most of these content areas is provided at Labourers' Training Centres. If task analysis techniques can analyze these jobs both from the technical aspect and from the aspect of basic skills and learning strategies as well, it will be much easier for the training centre administrators and trainers to refer workers to the appropriate next step in training and to know what other job areas in the range of jobs they are likely to be able to handle well with their present level of experience and training. It will also be easier for a labourer to identify further areas for training. Most important of all, the knowledge which can be gained from literacy task analysis will assist trainers to design curriculum which is trade specific while at the same time literacy sensitive.

The next step is for the analyst to compare several labourer jobs utilizing task analysis techniques and to build sample training materials based on the analysis. These items will be found in the Literacy Task Analysis Manual which will accompany the final Technical Report.

SUMMARY: TOWARDS THE PROJECT COMPLETION

As a summary note for the *Interim Report* we would like to provide a brief outline of a current plan that will help bring the Literacy Task Analysis Project to its completion. After documenting the eight case studies two chapters will be developed using the results of the literacy task analyses. These chapters will be incorporated into a final Technical Report. The fourth chapter - Literacy Task Based Training - will concentrate on the following topics:

* Guiding Curriculum Principles
* Course Design and Curriculum Development
* Using Findings from Task Analysis to Devise Training Materials
* Integrating the Basic Skills Categories
* Document Types in the Workplace
* Applying Problem Solving Techniques
* Critical Thinking Strategies
* Developing a Unit of Instruction

The fifth chapter - Helping Workers in the Future - will focus on:

* A Framework for Assessment and Certification of Trainees
* Resources for Developing a Job-Specific Workplace Literacy Program
* Project Recommendations - Retail Sector
* Project Recommendations - Automotive Sector
* Project Recommendations - Construction Sector

From the Technical Report a Literacy Task Analysis Manual will be developed for practitioners in the field and will address such concerns as:

1. Workplace Literacy Requirements
2. Characteristics of Successful Workplace Literacy Programs
3. Literacy Task Analysis Planning Checklist
4. Basic Steps of a Literacy Task Analysis
5. Practical Issues in Choosing a Method
6. Collecting Job and Task Information
7. How to Develop Task Listings, Task Descriptions and Task Matrices
8. Basic Steps in Using Task Analysis to Develop a Training Plan
9. Using Findings from Task Analysis to Devise Materials
10. Developing Job-Specific Curriculum
11. Sample Training Materials
12. Directions for Future Training Initiatives
13. Resources and References
14. Useful Forms in Conducting a Literacy Task Analysis
    (a) Employer Questions for Selection of Master Performer
    (b) Task Analysis Work Sheet

A Concluding Note

There are a great many variables which contribute to success in the workplace. Individual workers bring to their jobs a combination of attributes and skills which have been gained over a number of years in a number of different ways. This includes, on the one hand, personal and cultural values, and on the other

hand, abilities and skills that have been gained both in school and by exposure to various life situations. Workers who have obtained a firm grounding in basic skills are able to expand their horizons by qualifying for higher order jobs. For those workers who may find there is no space in their organization at present for promotability, a good grounding in basic skills will at least qualify them for lateral moves which can give them broader experience and mobility.

While schools have the primary role in teaching basic skills, there are a great many reasons why basic skill instruction does not end there. Many new Canadians and landed immigrants have not had access to our Canadian school system or its equivalent. They face the challenge of building new skills in a new land. In addition, many Canadians who were born and grew up in this country have experienced difficulty in mastering basic skills for a variety of reasons - ranging from poverty, to learning disabilities, to lack of opportunity or motivation. Most of these adults - both men and women - find their way into the labour force, with all the challenges and difficulties that it presents to individuals with basic skills deficits. For many of these individuals - particularly those who have shied away from formal educational channels - the learning which takes place in the workplace is the only significant learning option. Business, labour, education and government are beginning to recognize this fact and thus are seeking new partnerships and new methods to improve workplace basic training and upgrading.

Workplaces provide unique education and training opportunities to their employees. Company training directors, union educators and administrators, adult day or evening school teachers, community colleges and school boards all share in the task of upgrading the skills of workers through the forging of partnerships. Many of these individuals and institutions have expressed the desire to make training more relevant to the real needs of real workers. Literacy task analysis provides one such means to this end.

As mentioned earlier, the purpose of the project is to provide effective methods for conducting literacy task analyses in order to improve basic skills training in the workplace. This *Interim Report* has attempted to trace the progress made in meeting that objective. Throughout our investigation we have been encouraged by the interest generated from various constituencies on this topic. We have also been cognizant of the tremendous co-operation from the employers, employees and unions who participated in this project. With the data collection for the eight case studies nearing completion definite trends are now emerging for the most practical types of methods to use when conducting a literacy task analysis with various employees. As well, the early conclusions from the preliminary analysis have provided strategies for developing job-specific training materials, and in terms of the Literacy Task Analysis Manual a general outline now seems evident. Together these different

project activities have begun to shape the launchpad for success in the workplace. If basic skills training is indeed the launchpad for success, then literacy task analysis is the fuel that provides the lift off towards a brighter worker future.

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